Check List the journal of biodiversity data

NOTES ON GEOGRAPHIC DISTRIBUTION

Check List 13(3): 2101, 24 April 2017 doi: https://doi.org/10.15560/13.3.2101
ISSN 1809-127X

Range extension of *Lundomys molitor* (Winge, 1887) (Mammalia: Rodentia: Cricetidae) to eastern Rio Grande do Sul state, Brazil

Marcus Vinicius Brandão[1] & **Ana Claudia Fegies**

Programa de Pós-Graduação em Diversidade Biológica e Conservação, Universidade Federal de São Carlos, Campus Sorocaba, Departamento de Biologia, Laboratório de Diversidade Animal, Rod. João Leme dos Santos (SP-264), km 110 - Bairro Itinga, Sorocaba, CEP 18052-78, SP, Brazil
[1] Corresponding author. E-mail: puerabio@gmail.com

Abstract: The distribution range of *Lundomys molitor*, a cricetid rodent species known from only six localities, herein is extended about 295 km with the inclusion of a record from Rio Grande do Sul state. The new locality represents the easternmost limit of the distribution of this poorly studied species.

Key words: new records; Sigmodontinae; Oryzomyini; Lund's Amphibious Rat; southern Brazil

The description of *Hesperomys molitor* Winge (1887) was based on a fossil collected by Peter W. Lund from caves near Lagoa Santa, Minas Gerais, Brazil. Many years later, Voss & Carleton (1993) synonymized this fossil with *Holochilus magnus*, a large and rare cricetid described for Uruguay and southern Brazil (Hershkovitz 1955), and based on derived morphological characters placed it into the Oryzomyini tribe with the status of a new genus. Thus, *Lundomys molitor* remains as the single representative of a monotypic genus from the Oryzomyini radiation (Voss & Carleton 1993; Weksler 2003, 2006).

Lundomys molitor is characterized by a semiaquatic habit, hence being restricted to proximities to freshwater, such as marshes and streams bordered by grass and brush (Marques 1988; Voss & Carleton 1993). Moreover, regardless of its larger distribution in past times during Pleistocene and early Holocene (see Voss & Carleton 1993; Pardinãs & Teta 2011), *L. molitor* presents a current range distribution restricted to only five localities in Uruguay and a single locality in Brazil. Here, we provide an unreported old record of *L. molitor* in Brazil and extend its geographical distribution.

We examined five specimens (Table 1) classified as *Holochilus brasiliensis* and one as *Holochilus magnus* housed at the mammal collections of the Museu de Zoologia da Universidade de São Paulo, São Paulo (MZUSP).

The craniodental measurements were based on Voss et al. (2000) and taken with digital calipers to the nearest 0.01 mm: condyle-incisive length (CIL); length of the diastema (LD); crown length of the upper molar series (LM), breadth of first upper molar (BM1); length of the incisive foramina (LIF); breadth of the incisive foramina (BIF); breadth of the palatal bridge (BPB); breadth of the zygomatic plate (BZP); length of the rostrum (LR); length of nasals (LN); interorbital breadth (LIB); breadth across the squamosal zygomatic processes (ZB); breadth of the braincase (BB); zygomatic length (ZL). The craniodental values are shown in Table 1.

The main characteristics of *L. molitor* are a very large body size with unicolored dark long tail, which is much longer than the combined head-and-body length (Table 1); large whitish hindfeet, with well-developed interdigital webs that extends beyond the first phalanges among digits II, III, and IV; feet with five small plantar pads and fringes

Table1. Craniodental measurements (in mm) from specimens of *Lundomys molitor*. The (—) symbol represents data not available due to partially broken skull. Measurement codes follow those described in the text.

	Specimen				
Character	MZUSP 1433	MZUSP 2764	MZUSP 2765	MZUSP 324	MZUSP 1001
CIL	42.74	42.22	43.05	41.00	46.80
LD	12.20	13.03	—	13.60	13.70
LM	8.30	7.98	—	7.80	8.20
BM1	2.60	2.55	—	2.35	2.60
LIF	9.20	9.58	—	9.74	9.80
BIF	3.93	4.33	—	4.10	4.43
BPB	2.83	3.10	—	—	3.70
BZP	4.16	4.30	—	4.20	4.50
LR	15.50	—	15.30	15.35	16.90
LN	18.92	—	18.00	18.40	19.90
LIB	4.10	4.86	4.90	4.40	4.30
BB	18.8	17.88	—	16.8	18.90
ZB	24.45	25.56	—	25.9	28.60
ZL	19.87	20.90	20.57	20.53	22.10

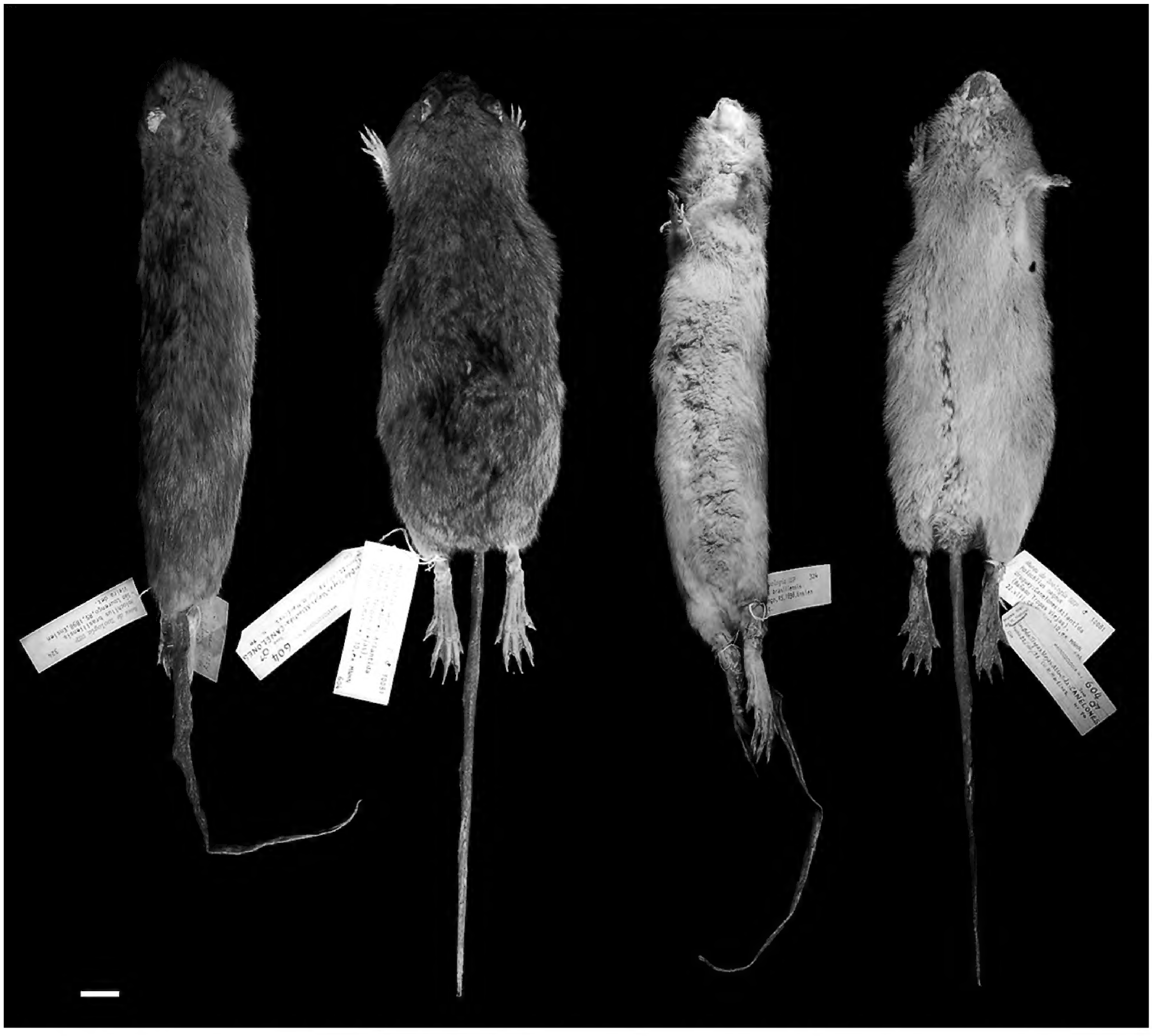

Figure 1. Dorsal and ventral views of the skin of *Lundomys molitor* from São Lourenço do Sul, Rio Grande do Sul (MZUSP 324), and from Canelones, Bañado de Tropa Vieja, Uruguay (MZUSP 10081). Scale = 20 mm.

of silvery hair along plantar margins, without ungular tufts; the dorsal pelage of the body is soft, long and dense, with a yellowish-brown coloration (darker dorsally and lighter at sides); ventral pelage is paler than lateral and dorsal, with gray-based and buffy tipped hairs; small ears with short, brownish or yellowish fur, without contrast with the remaining dorsal pelage (Figure 1) (Voss & Carleton 1993; Voss 2015).

Additionally, the skull (Figure 2) unequivocally presents *L. molitor* diagnostics characters (Voss & Carleton 1993; Weksler 2006; Voss 2015). Dorsal view: (1) narrow interorbital region with sharp supraorbital margin (Figure 3A); (2) blunt and massive rostrum flanked by deep zygomatic notches (Figure 3A); (3) postorbital ridge absent (Figure 3E). Ventral view: (4) incisive foramina long, extending between or posteriorly to M1 (Figure 3F); (5) palatal bridge long and narrow (Figure 2) with prominent posterolateral pits (Figure 3D); (6) parapterygoid fossae about as wide as the mesopterygoid fossa (Figure 3D); (7) derived carotid arterial circulation (pattern 3 of Voss 1988). Lateral view: (8) broad zygomatic plate with spinous anterodorsal process (Figure 3B); (9) subsquamosal fenestra large and subequally sized to postglenoid foramen (Figure 3E); (10) tegmen tympani not connected to posterior suspensory process of squamosal; (11) alisphenoid strut absent (Figure 3E). Dental characters (Figure 4): (12) molar dentition bunodont; (13) labial and lingual folds not interpenetrating; (14) M1 and M2 with small mesolophs; (15) M3 shorter than M2; (16) ml and m2 with small mesolophids (usually). Mandible characters (Figure 3C): (17) superior and inferior masseteric ridges converge anteriorly as an open chevron; (18) capsular process of lower incisor alveolus inconspicuous; (19) the coronoid process of the mandible is about level with the condyle.

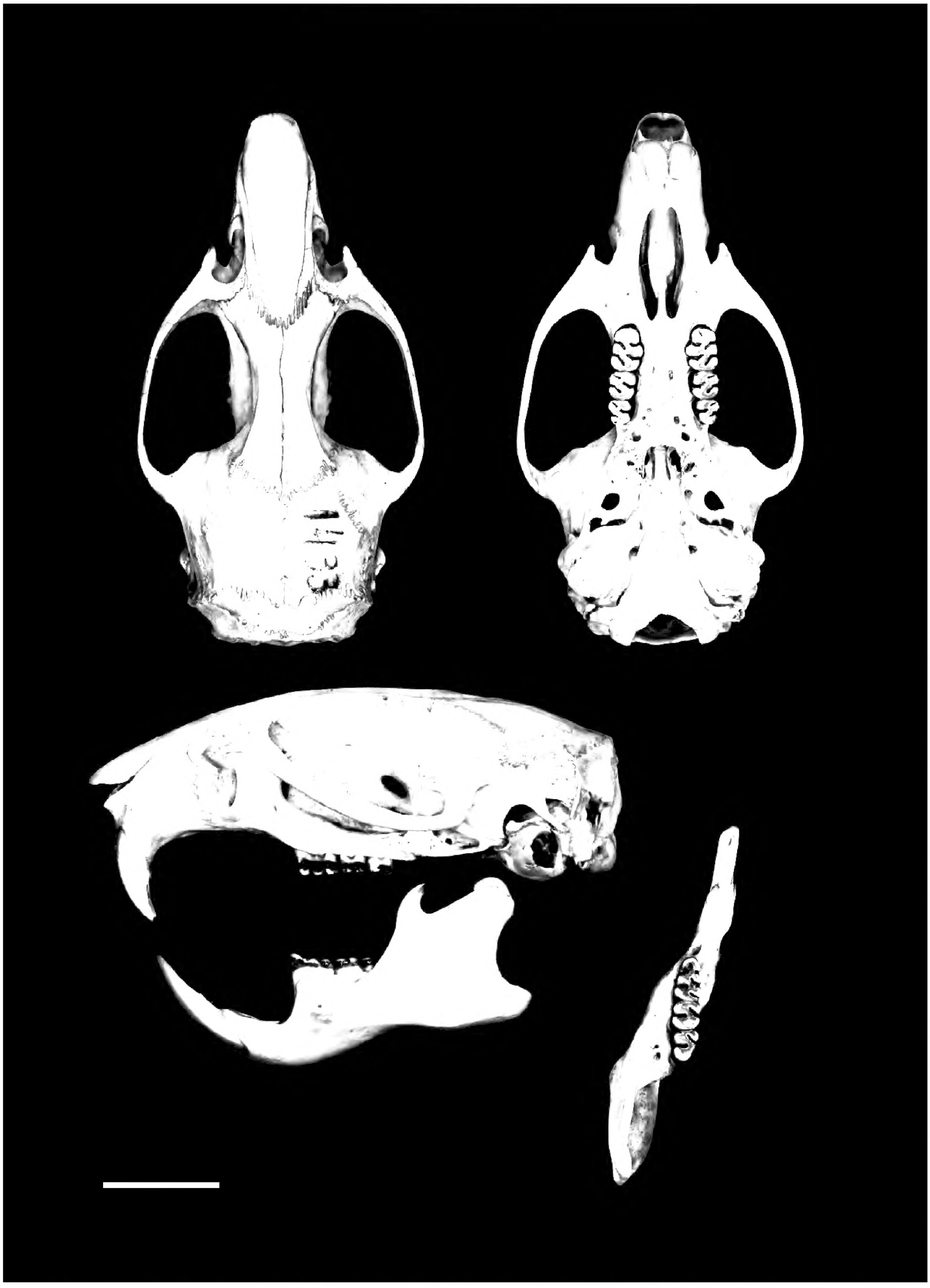

Figure 2. Dorsal, ventral and lateral views of skull and occlusal and lateral view of mandible of *Lundomys molitor* (MZUSP 1433). Scale bar = 10 mm.

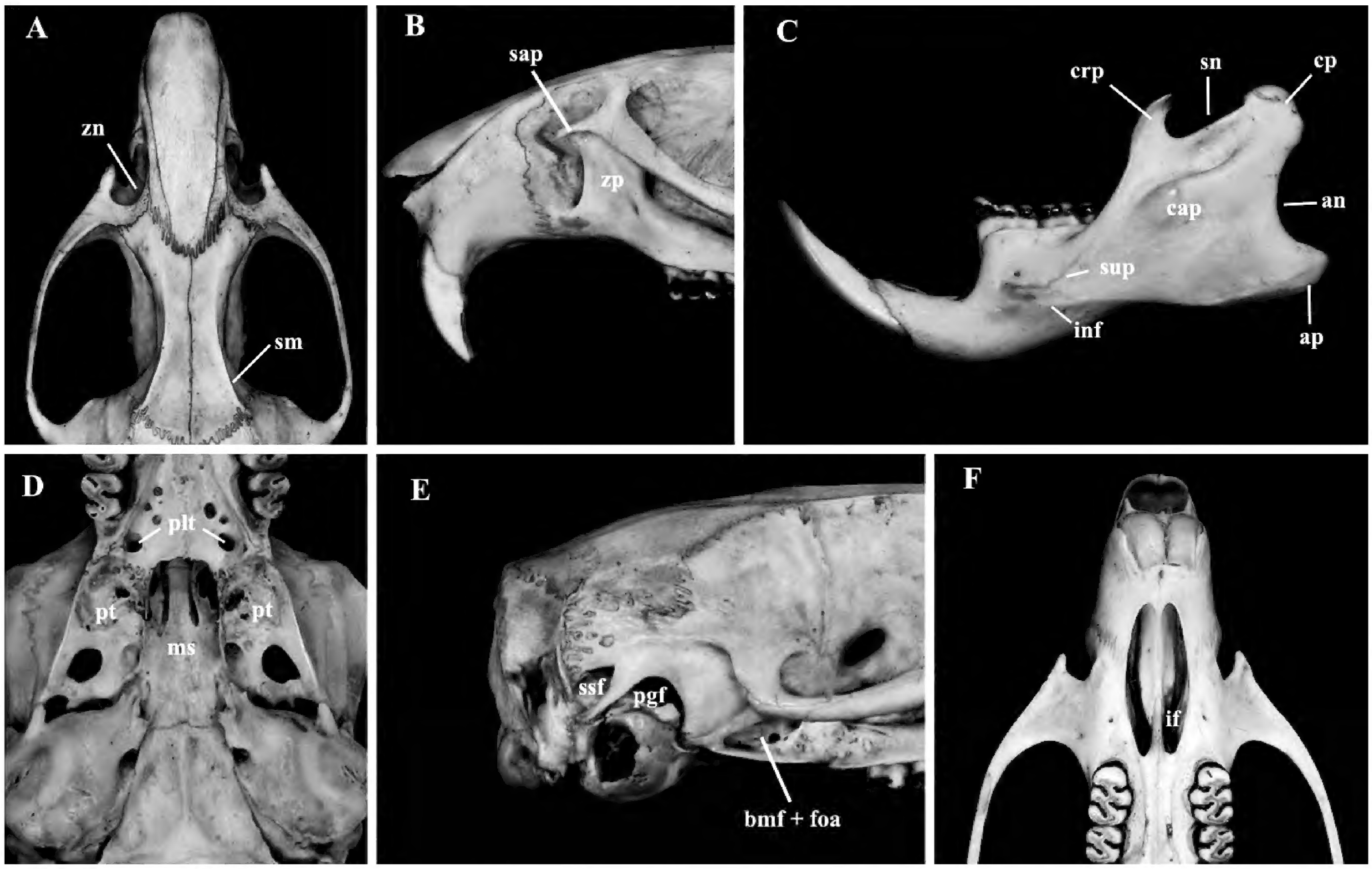

Figure 3. Detailed views of morphology of the skull (**A, B, D, E and F**) and mandible (**C**) of *Lundomys molitor* (MZUSP 1433). Labeled structures: angular notch (an), angular process (ap), buccinator-masticatory foramen (bmf), condyloid process (cp), capsular process of the lower incisor alveolus (cap), coronoid process (crp), incisive foramina (if), inferior masseteric crest (inf), foramen ovale accessorius (foa), mesopterygoid fossa (ms), palatal pits (plt), postglenoid foramen (pgf), pterygoid fossa (pt), supraorbital margin (sm), subsquamosal foramen (ssf), sigmoid notch (sn), spinous anterodorsal process of the zygomatic plate (sap); superior masseteric crest (sup), zygomatic notch (zn), zygomatic plate (zp). Note the confluence between bmf and foa as a result of the absence of bony strut on the alisphenoid (see VOSS & CARLETON 1993: fig. 10).

Based on these characters, we advocate that five *Holochilus brasiliensis* specimens from MZUSP from São Lourenço do Sul (31°22′12″ S, 051°58′48″ W) were misclassified, and with basis on its resemblance with an individual (MZUSP 10081) of *Holochilus magnus* (= *L. molitor*) from Bañado de Tropa Vieja, Uruguay, are also representatives of *Lundomys molitor*. Cranial dimensions (Table 1) matches the interval described for the species (Table 1: VOSS & CARLETON 1993). Unfortunately, no external and sex data are available for the São Lourenço do Sul specimens.

Notably few particular characters from São Lourenço do Sul specimens are a little different from those described in literature and the specimen from Canelones (MZUSP 10081). These features refer to the incisive foramina length, which although is notably long and extends very near to the level of the first molar alveoli (M1), it never reaches or surpasses M1 (Figure 3F); and to the poorly developed mesoloph/ids on upper and lower first (M1/m1) and second molars (M2/m2) (Figure 4). Conversely the specimen from Canelones and those described by VOSS AND CARLETON (1993) and FREITAS (1988) present the incisive foramina length distinctively extending between or posteriorly to M1, and more developed mesoloph/ids on M1/M2 and m1/m2.

The unreported record from São Lourenço do Sul extends the distribution area of the species about 295 km from its closer previously known locality (Figure 5). Nevertheless, *Lundomys molitor* still remains a poorly studied species, with very little information about its natural history.

Figure 4. Upper right (**A**) and lower left (**B**) molar toothrows in occlusal view.

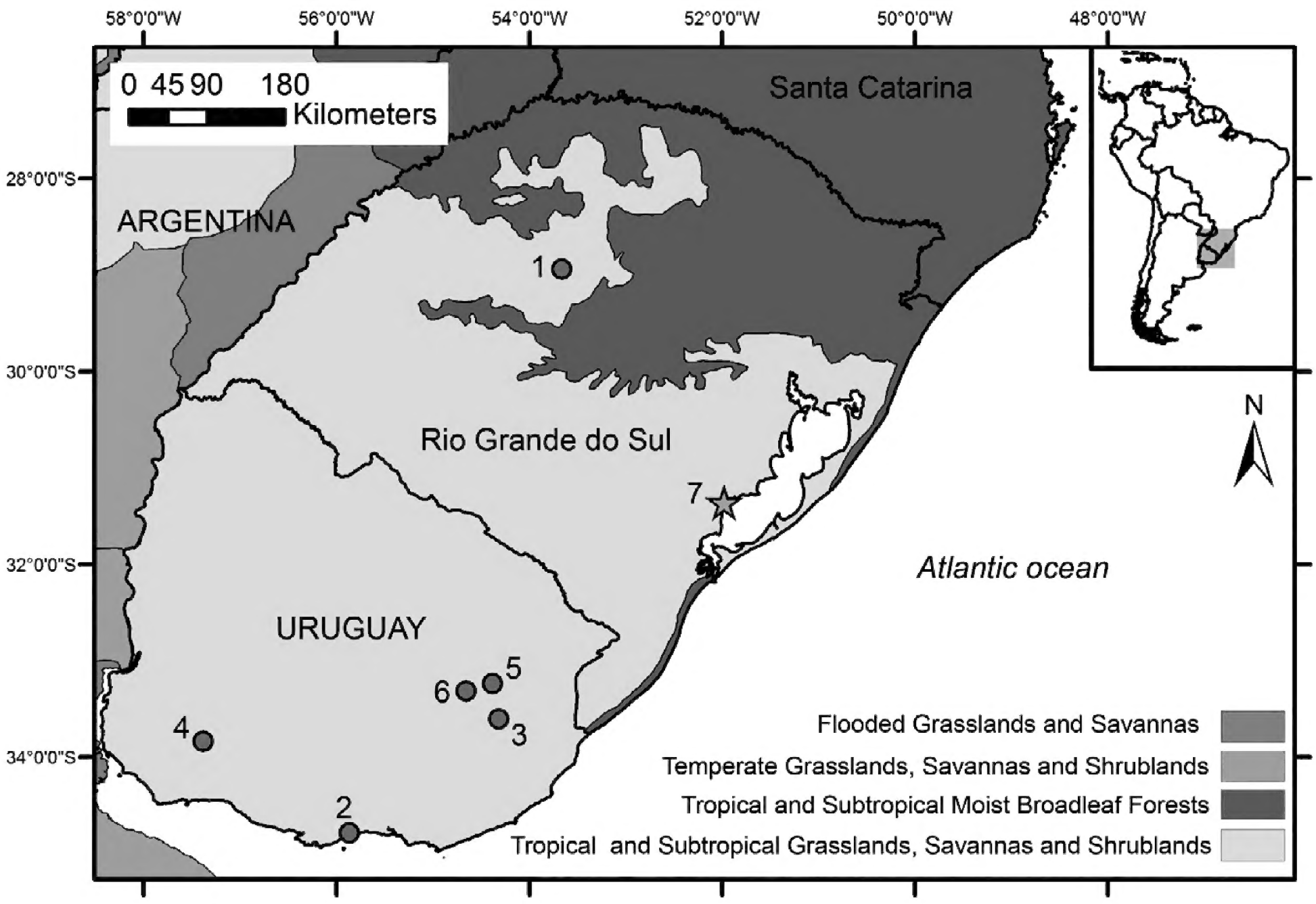

Figure 5. Map showing the known localities for *Lundomys molitor*. Star represents the new record presented here and circles are the records taken from Voss & Carleton (1993). Localities: Rio Grande do Sul: 1 – Tupanciretã; 7 – São Lourenço do Sul. Uruguay: **2** – Canelones, Bañado de Tropa Vieja; 3 – Lavalleja, Paso de Averías; 4 – Soriano, 3 km E Cardona; 5 – Trienta y Tres, 8 km E Trienta y Tres and 6 – 25 km WSW Trienta y Tres. (Ecoregions adapted from Olson et al. 2001).

The important role of specimens deposited in biological collections has been long debated through many different aspects of its importance (e.g., Patterson 2002; Vivo et al. 2014; Brandão 2015; Ceríaco et al. 2016). Our results reinforce the important role of scientific collections with continued maintenance, as the record presented here is from 1904, more than 100 years old. The lack of registered occurrence of *L. molitor* in recent years might be related to the capture methods used or to local extinction caused by anthropogenic impact.

Nevertheless, this species is still not considered under extinction risk locally or globally (see Marques et al. 2002; Gonzalez et al. 2008). There is a paucity of information on the distribution and population conditions of *L. molitor*, thus this species is considered Data Deficient on the Rio Grande do Sul threatened species list (Decreto 51797). We hypothesize that its conservation status may change in the near future with the inclusion of *L. molitor* in lists of threatened species, at least locally, since the increasing land use modifications in southern Brazilian grasslands (Pampas biome) makes it one of the most impacted biomes in Brazil (Overbeck et al. 2007).

ACKNOWLEDGEMENTS

We are grateful to Dr. Mario de Vivo and Juliana Gualda de Barros from MZUSP for allowing us access to specimens under their care, and to two anonymous reviewers for their contributions to an early version of the manuscript.

LITERATURE CITED

Brandão, M.V. 2015. The presence of *Wilfredomys oenax* (Rodentia: Cricetidae: Sigmodontinae) in São Paulo state, southeastern Brazil: a locally extinct species? Papéis Avulsos de Zoologia, 55(4):69-80. https://doi.org/10.1590/0031-1049.2015.55.04

Ceríaco, L.M.P., E.E. Gutiérrez & A. Dubois & 490 signatories. 2016. Photography-based taxonomy is inadequate, unnecessary, and potentially harmful for biological sciences. Zootaxa 4196: 435–445. https://org/10.11646/zootaxa.4196.3.9

Gonzalez, E., G. D'elia & U.F.J. Pardinas. 2008. *Lundomys molitor*. The IUCN Red List of threatened species.Version 2015.4. International Union for Conservation of Nature. Accessed at http://www.iucnredlist.org/details/10219/0, 19 April 2016.

Hershkovitz, P. 1955. South American marsh rats, genus *Holochilus*, with a summary of sigmodont rodents. Fieldiana Zoology 37: 639-673. doi: https://doi.org/10.5962/bhl.title.2902

Marques, R.V. 1988. O gênero *Holochilus* (Mammalia: Cricetidae) no Rio Grande do Sul: taxonomia e distribuição. Revista Brasileira de Zoologia 4: 347–360. http://doi.org/dxv4d5

Marques, A.A.B., C.S. Fontana, E. Vélez, G.A. Bencke, M. Schneider & R.E. Reis. 2002. Lista de referência da fauna ameaçada de extinção no Rio Grande do Sul. Decreto nº 41.672, de 10 de junho de 2002. Porto Alegre: FZB/MCT-PUCRS/PANGEA. 52 pp.

Overbeck, G.E., S.C. Müller, A. Fidelis, J. Pfadenhauer, V.D. Pillar, C.C. Blanco, I.I. Boldrini, B. Both & D. Forneck. 2007. Brazil's neglected biome: the South Brazilian Campos. Perspectives in Plant Ecology, Evolution and Systematics 9: 101–106. https://doi.org/10.1016/j.ppees.2007.07.005

Olson, D.M., E. Dinerstein, E.D. Wikramanayake, N.D. Burgess, G.V.N. Poill, E.C. Underwood, J.A. D'Amico, I. Itoua, H.E. Strand, J.C. Morrinson, C.J. Loucks, T.F. Allnutt, T.H. Ricketts, Y. Jura, J.F. Lamoreux, W.W. Ittengel, P. Hedao & K.R. Kassem. 2001. Terrestrial ecoregions of the world: a new map of life on Earth. BioScience 51: 933–938. http://doi.org/c635xt

Pardiñas, U.F.J. & P. Teta. 2011. Fossil history of the marsh rats of the genus *Holochilus* and *Lundomys*. Estudios Geológicos, 67(1): 111–129. https://doi.org/10.3989/egeol.40347.136

Patterson, B.D. 2002. On the continuing need for scientific collecting of mammals. Mastozoología Neotropical 9: 253-262. http://www.sarem.org.ar/wp-content/uploads/2012/11/SAREM_MastNeotrop_9-2_09_Patterson.pdf

Rio Grande do Sul. Leis e Decretos. 2014. Decreto nº 51.797 de 08 de setembro de 2014. Declara as espécies de Fauna Silvestre ameaçadas de extinção no Estado do Rio Grande do Sul. Diário Oficial do Rio Grande do Sul, Porto Alegre, 09 de setembro de 2014. Accessed at http://www.fzb.rs.gov.br/upload/20140919104139decreto51797.pdf, 14 February 2017.

de Vivo, M., L.F. Silveira & F.O. Nascimento. 2014. Reflexões sobre coleções zoológicas, sua curadoria e a inserção dos Museus na estrutura universitária brasileira. Arquivos de Zoologia 45: 105–114. http://www.revistas.usp.br/azmz/article/view/88076

Voss R.S. 1988. Systematics and ecology of ichthyomyine rodents (Muroidea): patterns of morphological evolution in a small adaptive radiation. Bulletin of the American Museum of Natural History 188: 259–493. http://hdl.handle.net/2246/927

Voss, R.S. 2015. *Lundomys*; pp. 346-348, in: J.L. Patton, U.F.J. Pardinas & G. D'Elia (eds.). Mammals of South America, Volume 2. Rodents. Chicago: University of Chicago Press.

Voss, R.S. & M.D. Carleton. 1993. A new genus for *Hesperomys molitor* Winge and *Holochilus magnus* Hershkovitz, with comments on phylogenetic relationships and oryzomyine monophyly. American Museum Novitates 3085: 1–39. http://hdl.handle.net/2246/4982

Voss, R.S., D.P. Lunde & N.B. Simmons. 2001. The mammals of Paracou, French Guiana: A Neotropical lowland rainforest fauna part 2. Nonvolant species. Bulletin of the American Museum of Natural History 263: 1–236. http://hdl.handle.net/2246/386

Weksler, M. 2003. Phylogeny of Neotropicaloryzomyine rodents (Muridae: Sigmodontinae) based on the nuclear IRBP exon. Molecular Phylogenetics and Evolution 29: 331–349. https://doi.org/10.1016/S1055-7903(03)00132-5

Weksler, M. 2006. Phylogenetic relationships of oryzomine rodents (Muroidea: Sigmodontinae): separate and combined analyses of morphological and molecular data. Bulletin of the American Museum of Natural History 296: 1–149. http://hdl.handle.net/2246/5777

Winge, H. 1887. Jordfundneognulevende Gnavere (Rodentia) fra Lagoa Santa, Minas Geraes, Brasilien. E Museo Lundii 1(3). Kjøbenhavn: H. Hagerup. 200 pp.

Authors' contributions: MVB collected the data and wrote the text; ACF wrote the text.

Received: 23 April 2016
Accepted: 24 March 2017
Academic editor: Terrence C. Demos